United States
Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Veterinary
Services

Escherichia coli 0157:H7 in U.S. Dairy Calves

National Animal Health Monitoring System

Human illnesses associated with *E. coli* 0157:H7, including hemolytic uremic syndrome (HUS), bloody diarrhea, and renal disease, can have serious implications. Sources of *E. coli* 0157:H7 human infection vary, but many documented outbreaks of disease have been traced to meat of bovine origin. *E. coli* 0157:H7 is transmitted by the fecal-oral route. Animals shed the organism in their feces which can contaminate the environment and expose other animals (Figure 1). Humans become exposed through contaminated meat, water, or milk. Person-to-person transmission is also an important source of secondary infections in humans.

Figure 1. E. coli 0157:H7 Route of Transmission

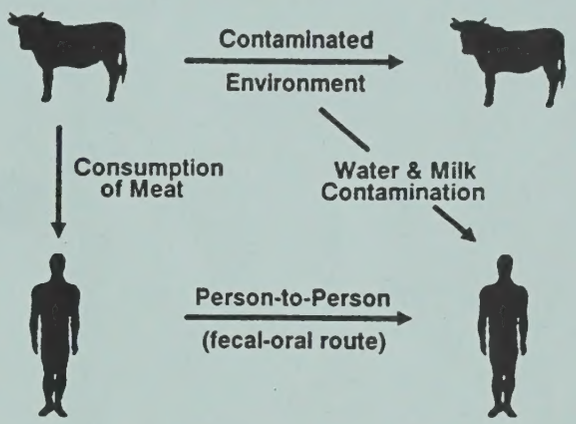
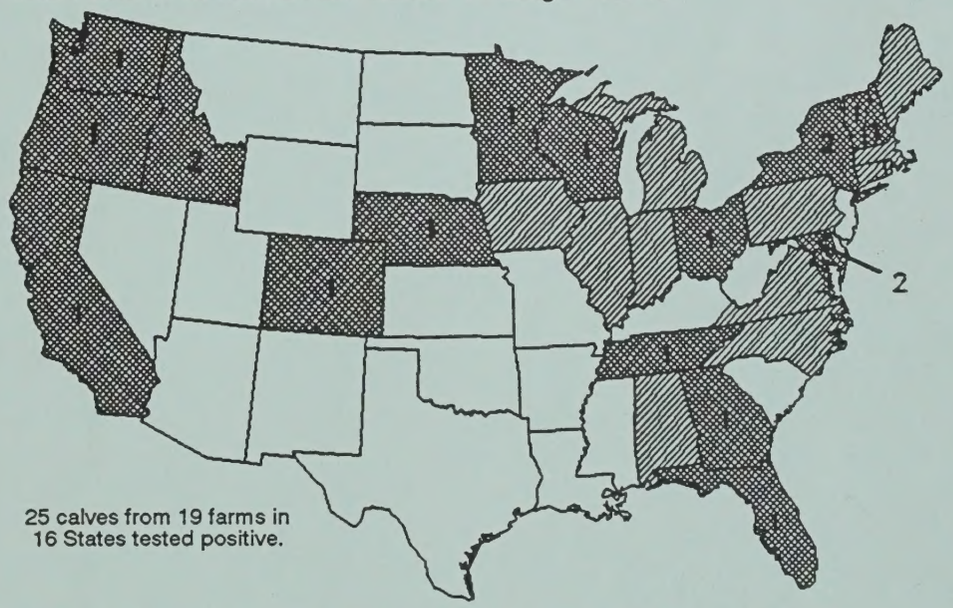


Figure 2. States Participating in the NDHEP E. coli 0157:H7 Studies and Number of Herds with Calves Testing Positive



The National Dairy Heifer Evaluation Project (NDHEP) was a one-year study conducted through the U.S. Department of Agriculture's National Animal Health Monitoring System (NAHMS). The study followed the neonatal calf to weaning. The NDHEP included 1,811 dairy operations in 28 states (shown at right). To be included in the study, the operations had to have 30 or more milking cows. Participants were randomly chosen so that the results would be representative of 78 percent of the National dairy cow population. Fecal samples were collected from approximately 7,000 preweaned calves from over 1,000 operations and tested for presence of *E. coli* 0157:H7.

Samples from a total of 25 calves from 19 farms (from 16 states) tested positive for the organism, for a prevalence of 3.6 per 1,000 preweaned calves. Figure 2 shows the wide distribution of operations with dairy calves found to be positive for *E. coli* 0157:H7. Positive operations were spread across the country, and no regional or seasonal clustering was found.

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To more clearly understand the relationship between the organism and the farm environment, a follow-up study was conducted. Objectives of the NAHMS follow-up study were to describe shedding (expelling the organism in feces) patterns in infected herds and to determine management factors associated with infection.

Producers from 50 negative NDHEP (control) herds and 14 positive NDHEP (case) herds agreed to participate in the follow-up study. Positive calves were found in 11 of the 50 herds that originally tested negative (22 percent) and 7 of the 14 herds that originally tested positive (50 percent). Although case herds were more likely to be found positive when retested, the two studies showed that herd status can change and, therefore, should not be defined by testing a few animals one time.

Positive animals ranged in age from 10 days to 8 months (Figure 3). *E. coli* 0157:H7 in animals less than 8 weeks of age had a prevalence of slightly over 1 percent. An increase in prevalence was shown at 8 weeks of age, which was identified as the average age of weaning (NDHEP results). Prevalence remained around 5 percent through 16 weeks of age.

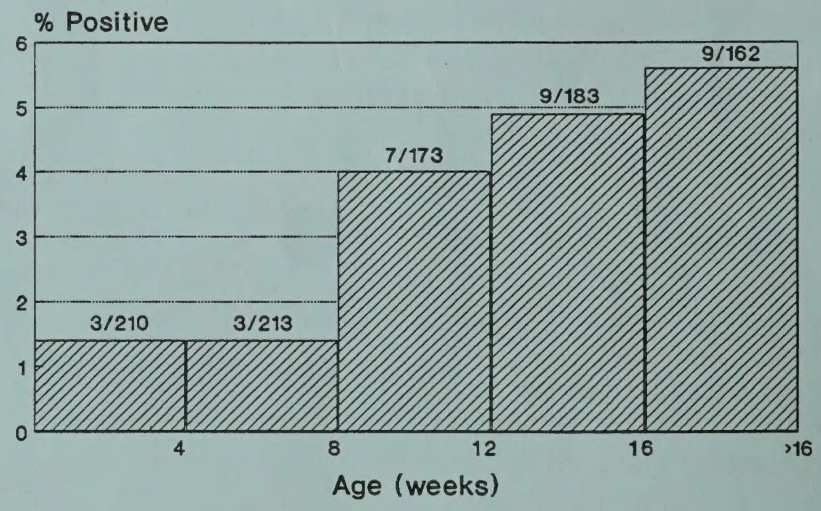
E. coli 0157:H7 shedding was significantly associated with weaning. Weaned calves were three times more likely to test positive than preweaned calves.

Although postweaned calves were more likely to be shedding, the preweaned period appears to have some impact on the ECO157 status of the herd. One preweaning factor that was associated with *E. coli* 0157:H7 status was when calves were grouped on the operation. If calves were grouped before weaning, the herd was nine times more likely to test positive than if they were grouped after weaning. This may indicate that grouping calves at early ages may increase transmission to other calves or precipitate shedding in already affected calves.

When fecal specimens were collected, calves were examined for diarrhea, dehydration, and body condition. Such signs of illness were not associated with the presence of *E. coli* 0157:H7 in the feces.

Management factors on dairy operations were evaluated, including a decrease in brucellosis vaccination in the northern tier of U.S. states, where *E. coli* 0157:H7 infection in humans is more commonly reported. Though some sources have proposed that brucellosis vaccination may provide some cross protection against *E. coli* 0157:H7, the NAHMS follow-up study did not support this hypothesis. No association was found between brucellosis vaccination and *E. coli* 0157:H7 shedding status in tested animals.

Figure 3. E. coli 0157:H7 Infection in Dairy Heifers by Age in Weeks (NAHMS Follow-up Study)



Participants in the NDHEP included the USDA's National Agricultural Statistics Service, State and Federal Veterinary Medical Officers, and National Veterinary Services Laboratories. The Cooperative Extension Service provided editorial assistance. For more information on National Dairy Heifer Evaluation Project and other NAHMS programs, please contact:

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